

**Unusual Caterpillar-Prey Records and Hunting Behavior
for a *Podalonia* Digger Wasp: *Podalonia valida* (Cresson)**
(Hymenoptera: Sphecidae)

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Observations on *Podalonia valida* (Cresson) were made in late summer and fall 1972, in an area immediately adjacent to the Chiricahua Mountains in extreme southeastern Arizona, about one mile west of the Chiricahua National Monument entrance, and about 35 miles south of Willcox, Cochise County.

The study area, described in more detail elsewhere (Steiner, in preparation), was situated in a riparian habitat along a temporary creek (Bonita Creek), in the Upper Sonoran/Transition Zones. This oasis-like area was surrounded by more arid desert scrub and grassland. Within the study area, a lush herbaceous vegetation, tall trees, and a shrubby understory were present.

Four female *Podalonia valida* were observed in the study area between September 10 and October 9, 1972. Detailed prey records were made on only one individual. This individual paralyzed and stored in her nests, large, very hairy caterpillars of the genus *Estigmene* (Arctiidae), exclusively. In seven observed cases, all prey were large hairy caterpillars ranging from a black color, with rufous-reddish lateroventral parts, to brownish-yellowish. All caterpillars were probably *Estigmene acraea* (Drury), or very closely related forms.

PREDATORY BEHAVIOR OF CATERPILLAR HUNTING WASPS

Lepidopterous larvae of various species, shapes, sizes, colors and habitats are preyed upon by digger wasps of the genera *Ammophila* and *Podalonia* (and some other genera including some solitary Vespidae). The majority of these wasps prey on naked caterpillars only (see for instance Murray, 1940; Muesebeck *et al.*, 1951; Evans, 1959; Powell, 1964; Krombein, Burks *et al.*, 1967, for Nearctic species, and Berland, 1925; Roth, 1928; Tsuneki, 1968, for Palearctic species). A few records of odd prey species are available, however. Thus according to Appleton (in Murray, 1940), *Podalonia occidentalis* Murray preys on the tent-caterpillar. *Ammophila pilosa pilosa* (Fernald) (= *azteca* Cameron) was found to store a Lycaenid larva, about 14 mm length, densely covered with short secondary setae, and also a Pterophorid larva (about

15.5 mm length), with numerous tufts of elongate secondary setae; these caterpillars have rather concealed feeding habits (Powell, 1964). Neither Lycaenids nor Pterophorids seem to have been reported as prey of other North American *Ammophila* (Powell, 1964). According to Ferton (1901, 1914), the Palearctic *Podalonia hirsuta* (Scopoli) (var. *mervensis* Radoszkowsky: "*Ammophila ebenina*" Costa) takes naked prey such as *Agrotis*, *Cucullia chamomillae*, but also hairy caterpillars, for instance *Epinephele jurtina* (Berland, 1925).

A number of *Podalonia* species of known biology prey on Agrotidae-Noctuidae (cutworms), sheltered underground during daytime, e.g., *Podalonia robusta* (Cresson): Evans, 1963; *luctuosa* and/or *communis* (Smith): Hicks, 1931, 1932, for Nearctic species—*hirsuta* (Scopoli): Fabre, 1879, 1882; *affinis* (Kirby): Marchal, 1892; *tydei* (Le Guillou): Fabre, 1879; Picard, 1903; *atrocyanea* Eversmann (= *chalybea* Kohl), *microhirta* Kohl and/or *caucasica* Morawitz: Tsuneki, 1968, for Palearctic species). The wasps excavate these nocturnal prey from their underground shelters.

Podalonia valida, in contrast, hunts diurnal lepidopterous larvae in the open, usually on dense herbaceous or low brushy vegetation such as white horsemint (*Monarda pectinata*), *Helianthus* (Compositae), and goldweed (*Verbesina encelioides*). In the area considered, these lepidopterous larvae were found to move from one plant species to another quite extensively. Whether this was related to polyphagous feeding behavior or to escape behavior, in response to disturbances by hunting wasps, was not determined, but captive specimens readily accepted some plants of the sunflower family. *Podalonia valida* was capable of following with great accuracy the fresh scent trails left by the caterpillars, while moving on the ground from one plant to another. The wasp proceeded head down, tapping her antennae on the ground, especially where the caterpillar had stopped and rested for some time (mostly at the bases of plants), or had made a sudden and sharp change in direction. This ground level search behavior often led the wasp to the base of one plant, where a concentrated search would be undertaken, the excitation of the wasp increasing steadily in the process. There is little doubt that the wasp was picking up more and more fresh olfactory evidence of a recent occupancy of the site by the prey. Often, the wasp would then climb up the plant and investigate it thoroughly. At other times the wasp would fly directly onto the plants, without first searching the ground. Discovery of the caterpillar did not necessarily follow, however, even if the wasp came very close to the prey. Such failure to capture the prey



FIG. 1. *Podalonia valida* carrying a large, paralyzed lepidopterous larva (*Estigmene acraea*) (Arctiidae), using her mandibles and fore legs to hold the prey. Locomotion, with two pairs of legs only, is assisted by wing beats.

was particularly frequent at early stages of hunting phases. This suggests that "motivational" deficiencies, rather than deficiencies in the ability to detect or locate the prey, were then involved. Such incomplete behavior is very frequent at early stages of the different phases of the nesting cycle in digger wasps (Steiner, 1962). These abortive activities are particularly conspicuous during the nest-digging phase, resulting in one or several incomplete burrows abandoned at once. Such truncated behavior also occurs at early stages during other phases of the nesting cycle, including the hunting and prey-stinging stages (Steiner, 1962), and several aborted pursuits, attacks or stinging of prey by *Podalonia valida* were recorded in this study. In these cases the wasp did not make any further attempt at pursuing the escaping prey. At such early stages, in contrast to later stages of the hunting phase, the wasp would not usually accept a suitable prey, even if dropped right in front of her. Such apparent unwillingness to capture a detected prey has also been reported from other wasps, including other *Podalonia* species. For example observations made on *Podalonia luctuosa* (and/or *communis*) (Newcomer, 1930; Hicks, 1931, 1932, in Murray, 1940), which preys on cutworms (Noctuidae), concealed beneath the soil by day, revealed abortive termination of digging behavior during hunting.

No evidence of hunting by sight was found in *P. valida*, except perhaps at very close range. Little information on prey stinging was ob-

tained, since this occurred mainly in very dense vegetation and was accomplished within a very short period of time. The heavy, cumbersome prey is straddled and carried over the ground in typical *Podalonia* fashion, using the mandibles and also the front legs, which embrace the larva (Fig. 1). Wing beats provide some additional propulsive force.

A more detailed account of the biology and behavior of this *Podalonia* species will be presented elsewhere.

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